

Zero Retries 0240

2026-02-27 - ARRL's New Digital Networking for Ham Radio Book, Alliance Amateur Radio Society, New High-Performance Software Defined Radio, Auto-NVIS

Steve Stroh N8GNJ

Zero Retries is an independent newsletter promoting technological innovation in and adjacent to Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fifth year of publication, with 3500+ subscribers.

Steve Stroh N8GNJ, Editor

editor@zeroretries.net

This issue of Zero Retries was originally published on Ghost - <https://www.zeroretries.radio/zero-retries-0240/>. Thus all links that were for zeroretries.radio have (attempted to) been changed to equivalents on zeroretries.org.

See this archive page:

<https://web.archive.org/web/20260412233955/https://www.zeroretries.radio/zero-retries-0240/>
for how it originally appeared on www.zeroretries.radio.

Substack says this issue **is too big for email clients**. Thus, it might be easier to read in a web browser - <https://www.zeroretries.org/p/zero-retries-0240-3be>.

In This Issue...

- [Request To Send](#)
 - [Paid Subscribers Update](#)
 - [Hamvention 2026 Ho!](#)
 - [Big Update of the Zero Retries About Page](#)
 - [Porting Over from Substack - No Progress This Week](#)
 - [\(Invalid\) Security Warnings for \[www.zeroretries.radio\]\(http://www.zeroretries.radio\) - Part 3](#)
 - [Administrivia](#)
 - [Weekends Are For Amateur Radio!](#)
- [Impressions of ARRL's New Digital Networking for Ham Radio Book](#)
 - [Notable Inclusions In This Book](#)
 - [Minor Nitpicks](#)
 - [The Problem With a Book... Is That *It's a Book*](#)

- [Lots of Digital Networking Occurring on Amateur Radio VHF / UHF Bands](#)
- [The “Encryption” Bogeyman](#)
- [Conclusion](#)
- [A Suite of ARRL Amateur Radio Networking Books?](#)
- **[ZR > BEACON](#)**
 - [TPRFN Two New Resource Pages](#)
 - [New Amateur Radio Organization - Alliance Amateur Radio Society](#)
 - [New High-Performance Software Defined Radio](#)
 - [Auto-NVIS: Autonomous Ionospheric Nowcasting System](#)
 - [2026 Hamcation AMSAT Forum | Drew Glasbrenner, KO4MA President's Update](#)
- **[Closing Thanks](#)**
- **[Permission to Reuse Zero Retries Content](#)**

Request To Send

Paid Subscribers Update

My Thanks this week to:

- **Joe Hamelin W7COM** for *renewing* as **Founding Member 0014!**
Founding members are listed in every issue of Zero Retries!
- **Prefers to Remain Anonymous 66** for *renewing* as an **Annual Paid Subscriber!**
- **Dave Kolesar W3KCK** for *upgrading* from a free subscriber to an **Annual Paid Subscriber!**
- **Charles Riley G4JQX** for *three years* of being a **Paid Subscriber!**
- **Prefers To Remain Anonymous 22** for *three years* of being a **Paid Subscriber!**

Financial support from Zero Retries readers is a significant vote of support for the continued publication of Zero Retries.

Hamvention 2026 Ho!

Unexpectedly, Hamvention 2026 made a booth available to Zero Retries! And we promptly offered to share it with Kay Savetz K6KJN of [Digital Library of Amateur Radio & Communications \(DLARC\)](#). Like Zero Retries, DLARC will be exhibiting at Hamvention for the first time. We'll also be reaching out to some high profile friends of Zero Retries (and DLARC) to make “booth time” available. The first acceptance of that offer was from Cale Mooth K4HCK of Amateur Radio Daily / [Amateur Radio Weekly](#) / Net Finder.

[Hamvention 2026](#) is 2026-05-15 thru 17 in Xenia, Ohio, USA. Both K6KJN and I look forward to being at a stable location where we can meet up with Zero Retries and DLARC fans. More details soon.

12 weeks...

Big Update of the Zero Retries About Page

I had created an About item in the menu bar of the new Zero Retries page... but didn't (re)create an actual About page there. **Oops!** That was being flagged by several people as potentially one of the "security" issues about www.zeroretries.radio.

So I copied the About page from Substack, and there was a lot of info there that really needed to be updated, so I spent a day updating it. <https://www.zeroretries.radio/about/> <https://www.zeroretries.org/about>. It's now reasonably complete, up to date, and perhaps slightly entertaining. There's some remaining work to do (marked with "tk"s).

Post Publication Update - *If you're reading this after 2026-04-03, the conversion to Ghost / www.zeroretries.radio didn't work out and Zero Retries is again being published on Substack / www.zeroretries.org. Thus the info in this section is retained solely for historical reference.*

Porting Over from Substack - No Progress This Week

Administrivia Alert!

Nothing bad happened this week, it was just busy, busy, busy with other normal life things. So the big "port over" of email addresses from Substack email subscribers into Ghost email subscribers didn't happen. *Again*.

(Invalid) Security Warnings for www.zeroretries.radio - Part 3

Administrivia Alert!

But nothing *good* happened this week either - no big breakthroughs in the lingering security issues some folks are experiencing with their computer / Internet security systems in accessing zeroretries.radio.

In the struggle with the security issues of using zeroretries.radio as a domain name for this newsletter, I was reminded (I forget by what) of the [Sunk Cost Fallacy](#). I've invested so much time (and attention, and energy) into using zeroretries.radio that I want to just "gut it out" and hope it "fixes itself" *eventually*. (?) *That is the definition of the Sunk Cost Fallacy.*

One issue is... what alternative, "mainstream" domain name could I use in place of **zeroretries.radio** that would be more palatable to the inscrutable and opaque *Internet Security Industrial Complex* that I seem to have run afoul of? Then I remembered that, out of habit, I registered **zeroretries.com**. (*D'Oh!*) At the moment, that's used solely as a redirect to **zeroretries.org**. I also own **zeroretries.net** (*Double D'Oh!*) which I'm currently using solely for email, and another web redirect to zeroretries.org. So, I have some options. If I can't get this silliness resolved reasonably soon and stop expending time and attention on it, it seems (increasingly) more reasonable to just "bail" on using zeroretries.radio for Zero Retries on Ghost and use it solely as a fun redirect to the actual domain that's hosting Zero Retries.

Post Publication Update - *If you're reading this after 2026-04-03, the conversion to Ghost / www.zeroretries.radio didn't work out and Zero Retries is again being published on Substack / www.zeroretries.org. Thus the info in this section is retained solely for historical reference.*

Post Publication Update 1 - D'Oh... I realized that I'm just working against myself forwarding of zerorettries.com and zerorettries.net to zerorettries.org (since I'm no longer publishing the new content there). Both of those domains are now being forwarded to zerorettries.radio.

Administrivia

I had to chuckle when I read this by Justin Giorgi AI6YM in his [most recent newsletter](#):

Administrivia

tl;dr - The store moved to Shopify so I can focus on making cool stuff. The blog will move to another platform soon for the same reason.

I am 100% stealing 'Administrivia' from Steve Stroh (N8GNJ) of Zero Retries without shame. Thanks Steve!

You're welcome Justin! I'm glad *administrivia* works well for you too.

Weekends Are For Amateur Radio!

This weekend is the great gathering-up of schtuff that I now consider extraneous to the core missions / fun activities / future projects in N8GNJ / Zero Retries Labs. This is in preparation for schlepping it all to the [Mike & Key Amateur Radio Club's 44Th Annual Electronics Show & Swap Meet](#) on **Saturday, 2026-03-07** in Puyallup, Washington.

My goal in taking the schtuff to "Mike & Key Flea" is to be *purged of it*. All items will be "priced to move"; revenue generation from the schtuff is a *very* secondary priority to *purging* it. Anything that I take there that is not redistributed to my fellow Amateur Radio Operators and electronics aficionados will be donated as "electronics recycling" at the wonderful [RE:PC retail store in Kent, Washington](#). If I do end up going to RE:PC, I'll try *not* to... and almost certainly fail... to browse the trailing edge electronics on display there. And, since I'm in the Seattle area, I have a few electronics doodads to pick up at the equally wonderful [Vetco Electronics retail store](#) in Bellevue.

Have a great weekend, all of you co-conspirators in Zero Retries Interesting Amateur Radio activities!

*Please direct comments / feedback about **Request To Send** to the [Zero Retries email list with the #ZR0240 hashtag](#).*

Steve N8GNJ

Impressions of ARRL's New Digital Networking for Ham Radio Book

By Steve Stroh N8GNJ

This week I received my (paid, not review - I was one of the supporters of this book - see below) copy of ARRL's brand new book [Digital Networking for Ham Radio](#) by Glen Popiel KW5GP.

First and foremost, I'm delighted that ARRL has published a Zero Retries Interesting book about **Data Communications Networks** that operate in **Amateur Radio spectrum**, by **Amateur Radio Operators**! KW5GP clearly put a lot of work into the *250 pages* of this book. I consider this new book to be only the second modern treatment by ARRL of Amateur Radio data communications in the 2020s. (The first was the significant update of the data communications section in the 100th Edition of the ARRL Handbook last year, which I helped to write.)

It's refreshing that this book doesn't get bogged down in any discussion of the previous century of Amateur Radio activities, even those digital / data activities that are somewhat relevant such as Radio Teletype (RTTY). Given his involvement (he literally [wrote the book](#)) I'll forgive the author for the few nostalgic mentions of High Speed Multimedia (HSMM) which has now been entirely deprecated by the rapid evolution and capabilities of AREDN.

It's gratifying to see ARRL recognize, formally, with this book, that data networks in the Amateur Radio microwave bands *is* an active segment of Amateur Radio activity.

There's a lot to like about this book. I particularly appreciate that the book treats the TCP/IP network protocol matter-of-factly as a useful technology in Amateur Radio, with good explanations. The tutorials about how TCP/IP works, and troubleshooting TCP/IP issues, merit additional study over time.

Another thing to admire about this book was that ARRL offered an opportunity for clubs and individuals to show their support for this book, and this topic, in advance with financial contributions, in return for a brief mention in the book. More generally, I hope that advance financial support by those organizations and individual members sent an effective message to ARRL leadership that this topic is important within Amateur Radio. I took advantage of that opportunity to showcase:

- **Organizations:**
Zero Retries Newsletter
(Page 245)
- **Clubs:**
WETNET / Puget Sound Amateur Radio TCP/IP Network and Group Silent Keyboards
(Page 246)

There were a total of 39 organizations / clubs listed. Because they were savvy enough to financially support this book / topic in advance, *I'm going to check out every one of them*as potentially Zero Retries Interesting.

I was also gratified to be mentioned in the Acknowledgements (Page 249):

A special thanks go out to...

Steve Stroh, N8GNJ, editor of the Zero Retries Newsletter

(and others...)

for their invaluable assistance in the research for this book.

I was happy to help KW5GP in offering ideas for some of the areas that should be covered.

Notable Inclusions In This Book

- The book is sprinkled with useful, self-contained nuggets of information that help average Amateur Radio Operators understand some of the nuances of data communications networking on microwave frequencies. Examples:
 - **dB vs. dBm vs. Watts** (Page 27) The use of dBm has always frustrated me, and I often resort to just asking an AI app "translate x dBm to watts". KW5GP gives a reasonable explanation for why dBm, rather than watts, is used.
 - **Ethernet Data Cable** (Page 28) Discusses some of the significant differences between Category 5 and Category 6 cabling.

- It would be great if these “nuggets” were listed in a separate Table of Contents.
- The chapter **Backup and Redundancy** is a subject often overlooked in building networks. If a network isn't working... *why*? Thus having the ability to monitor a network (before something goes wrong) is a critical element in a usable (reasonably reliable) network. Several networking monitoring systems are discussed.
- The chapter **Deploying Amateur Radio Networks** is another often overlooked topic about the criticality of ensuring adequate Fresnel zone clearance in outdoor microwave networks. It's not enough to merely have optical line of sight between two points, there must be adequate Fresnel zone (ground) clearance in the path. Several path prediction tools are discussed.

Minor Nitpicks

Any book, and especially this book (already at 250 pages) cannot be all things to all readers. In suggesting additional content, I acknowledge that “more content” comes at the cost of a thicker, more expensive, perhaps less easily readable book that would require more time to research and write.

- The mention of The Amateur Packet Radio Network (AMPRNetSM) (Page 10) isn't well researched. The more common name for this block of (now) 12M IPv4 addresses is **44Net** (amprnet.org is the associated domain name available for use with using 44Net IP addresses. Example - one of my systems was sw.n8gnj.wetnet.ampr.org). Also, the revenue generated from the sale of 44Net IPv4 addresses was more than 2x the revenue reported in this section. Better coverage of the importance and relevance of 44Net is suggested for future editions.
- There was no substantive mention (that I recall) of antenna polarization (or much discussion of the critical role of antenna selection) for microwave network nodes. This topic merits discussion as, for example, to access my local HamWAN node, I made the mistake of purchasing a solid, high gain dish antenna. That antenna turned out to be completely unsuitable due to wind load, and unnecessary because the node is easily accessible with a smaller, lower gain mesh antenna which has much lower wind load.
- There was little discussion of the role of power supplied to radios over Ethernet cabling. There is the formal, standardized Power Over Ethernet specification - 802.3af... *and everything else*. Some radios can use 802.3af power supplied by an 802.3af Ethernet switch. Other radios require their own unique power supply. *Those two types of power requirements aren't compatible*. That discussion would make a good “nugget”.
- There was little discussion of *applications* that can be used over Amateur Radio data networks such as AREDN and HamWAN. In the end, these are just networks, the radio equivalent of an Ethernet cables. What makes such networks interesting and useful is the *applications* that can be used over them such as Voice Over Internet Protocol (VOIP) telephony (such as Asterisk), email (independent of the Internet), file servers, high resolution cameras / videoconferencing (de facto Amateur Radio Television). Not to mention being able to supply connectivity for repeater linking, repeater management, accessing remote Amateur Radio receivers and transceivers, Internet interconnection, etc.
- While there was a brief discussion of the role of Private IP addresses (**Public vs. Private IP Addresses** - Pages 45 and 46) such as 10.x.x.x, 192.168.x.x, etc., this is a subject in Amateur Radio data networks that deserves a fuller treatment as it can get confusing fast. For example, how AREDN uses (and self-assigns) 10.x.x.x addresses within AREDN networks can really cause issues, despite AREDN's goal of largely automating and insulating IP address management from users. This discussion would be well complemented by a discussion of why the public (and globally unique) IPv4 addresses available from 44Net are so valuable and

useful in Amateur Radio networks. This is particularly true when Amateur Radio networks are interconnected via Internet such as AREDN's tunnel servers.

- I disagree with KW5GP that IPv6 is not generally relevant in Amateur Radio TCP/IP networking. There are *many advantages* to using IPv6 that could be useful in Amateur Radio data networks, beyond just the exponential increase in the number of IP addresses with IPv6. For example, all of the complexities and hassles with Public vs Private IP addresses, Network Address Translation (NAT) are irrelevant when using IPv6. All modern systems, such as Linux, Windows, and MacOS, and modern networking equipment is "dual stack" and thus capable of operating on both IPv4 and IPv6.

The Problem With a Book... Is That *It's a Book*

In my comments that follow, I don't mean to detract that the subject of **Amateur Radio Microwave Data Communications Networking** now has a (modern) dedicated book on the subject. And, *this book will get noticed* because the author has credible history, [having authored a previous book](#) (Amazon search link) on this subject, and this book is **published by ARRL**. Thus this book, and this subject, *will get attention and mindshare* within Amateur Radio if for no other reason than it will be advertised by ARRL, featured at each Ham Radio Outlet store's book section, etc.

But... even at 250 pages, there's a lot of glaring lacks on the subject of *Digital Networking for Ham Radio*. I think a more accurate title of this book would be **Microwave Data Networks for Amateur Radio**, as the book discusses operations almost entirely on the 2.x GHz and 5.x GHz Amateur Radio bands, with brief mentions of the Amateur Radio bands at 902-928 MHz, and 3.x GHz.

Part of the issue is that *this is a book... and books require significant time to write* (I'm acutely, **personally aware of this issue** 😊). But the time required to write a book gets no deference from *rapidly* evolving Amateur Radio data network technology. Examples:

- While 44Net and the use of 44Net IPv4 addresses is discussed in the book... ARDC's [44Net Connect](#) service (a free Virtual Private Network) became fully operational in late 2025. 44Net Connect makes the use of 44Net IPv4 addresses in Amateur Radio networks *almost simple*... certainly much more *practical* for the average Amateur Radio Operator, or organization, or project - because "*it's just Wireguard; everyone knows Wireguard*".
- The changeover of AREDN's mesh networking technology [from OLSR to Babel](#) was completed by the end of 2025. Beginning in 2026, AREDN firmware includes only Babel mesh networking technology. The inclusion of Babel makes AREDN units / networks able to be dynamic, automatic, auto-discovery mesh networking *again* with significantly improved reliability and performance compared to using OLSR. Use of OLSR became a handicap in AREDN networks, often requiring the use of static routes / links to maintain reliability. Extensive testing with Babel in AREDN has proven it to provide stable networks, but still dynamic (minimal need for static routes / links).
- Another development of AREDN technology in late 2025 is its support for "new" [802.11ah](#) / Wi-Fi HaLow network devices that operate on the 902-928 MHz band that Amateur Radio shares with unlicensed use / users. That development makes the use of 902-928 MHz very practical and useful for localized high speed data networks, especially in areas where trees are abundant as 902-928 MHz signals can "punch through" tree foliage - to a limited degree. This is in contrast to 2.x / 3.x / 5.x GHz signals that cannot penetrate tree foliage.
- While Meshtastic receives significant coverage, the recent and rapid evolution of [MeshCore](#) (and the even newer [MeshCom](#)) is not mentioned. MeshCore and MeshCom began getting

significant attention in 2025, especially among Amateur Radio users (using 433 MHz and 915 MHz) as “Meshtastic *that works*”.

There were also some gaps on this subject (microwave data networking) in the book:

- Use of radio networking equipment and networks that operate on *unlicensed* spectrum, adhering to *Part 15.247 regulations* weren't discussed. Use of unlicensed spectrum / equipment is a valid option for Amateur Radio and there are *many* such networks *operated by Amateur Radio organizations* such as [Rocky Mountain Ham Radio's Amateur Microwave Network](#), [BCWARN](#), and [HAMNET.EU](#) (Highspeed Amateurradio Multimedia NETwork). They use unlicensed equipment and spectrum because:
 - “Part 15” equipment, especially systems designed for use complex, long range, outdoor networks by *Wireless Internet Service Providers (WISPs)* (as opposed to “Wi-Fi”) such as equipment by Ubiquiti and MikroTik, well designed for the purpose of wide area outdoor networks and usable *as-is*.
 - AREDN and HamWAN modifications to “Part 15” equipment are considered by some to be too limiting (such as disabling encryption) or of little use, especially with the evolution of “WISP-grade” networking capabilities in the mid 2020s.
 - There *was* dedicated, reserved spectrum for Amateur Radio networking at 3.x GHz and 5.x GHz, but Amateur Radio use of 3.x GHz has been deprecated, and much of the “Amateur Radio” portion of 5.x GHz is now dual-allocated for unlicensed use (no longer exclusive for Amateur Radio).
 - Despite the theoretical advantage of Amateur Radio operation under Part 97 rules being able use higher transmit power than operation under Part 15.247 rules... higher power is generally unneeded in microwave networks. If you have an optical line of sight path with adequate Fresnel Zone clearance and a reasonably clean channel then the link will almost always work at Part 15.247 power levels.
- Icom's (now decades old) D-Star Digital Data (DD) Mode would seem to qualify for mention in this book given that it operates exclusively on the 1240-1300 MHz (23 cm) band. While DD mode radios don't have built-in TCP/IP (they're effectively an Ethernet bridge), they are certainly network devices - albeit half-duplex radios with a data rate of 128 kbps. DD mode is usable and still relevant because it continues to be supported in Icom's ID-RP1200VD repeater and the Icom IC-705 and the Icom IC-9700 radios as well as the now-discontinued Icom ID-1 radio. I have documented in Zero Retries that there are a dozen or so DD mode repeaters (data communications networks) still in active use in North America.
- Some Amateur Radio microwave networks have begun using **10 GHz** links. Such links have the significant advantage of Amateur Radio exclusive spectrum from 10.0 - 10.5 GHz (500 MHz!), at least in the US. Thus wider channels are available resulting in faster speeds. One vendor of 10 GHz equipment, Mimosa Networks, is willing to supply units within the US that operate in 10.0 - 10.5 GHz with proof of an Amateur Radio license. There have been a number of ARDC grants provided for developing such links.
- The [QO-100 Amateur Radio payload](#) in Geosynchronous Earth Orbit (GEO) above the Eastern Hemisphere is effectively a “hemisphere-wide” Amateur Radio microwave network. Data communications is “just another use case” on QO-100, especially on the [Wideband Transponder](#). What's different with QO-100 versus typical Amateur Radio satellites is that QO-100 is usable 24x7x365 with simple fixed dish antennas largely pointed towards the sky instead of the horizon (through ground clutter). Another difference with QO-100 versus typical

Amateur Radio satellites is that accessing it is only via Amateur Radio microwave spectrum - 2.x GHz uplink, 10.x GHz downlink.

Lots of Digital Networking Occurring on Amateur Radio VHF / UHF Bands

My biggest... *suggestion*... for this book, especially the title being “Digital Networking for Ham Radio” would be for it to be expanded to cover Digital (*Data*) Networking that’s occurring in the Amateur Radio VHF / UHF bands. In my opinion, that’s where a great deal of the value-add of Amateur Radio in contributing to modern radio technology is - figuring out how to do good data communications networks *in VHF / UHF*. For example:

- Amateur Radio Packet Radio networking may have fallen out of everyday use with most Amateur Radio Operators... but it’s *hardly* “dead, gone, irrelevant”. Indeed Packet Radio been *revitalized* in the past decade with innovations in this era such as:
 - The Raspberry Pi computers that are inexpensive enough and capable enough to be used as dedicated “radio computer appliances”,
 - The [Dire Wolf Open Source Software TNC](#),
 - The creation of two Forward Error Correction (FEC) systems - [FX.25](#) and [IL2P](#) (both supported by Dire Wolf),
 - TNCs that are capable of faster data speeds such as the [DigiPi](#), the [NinoTNC](#), and (still in development) [MMDVM-TNC](#) running on MMDVM modems.
- New Packet Radio (NPR), offering data speeds up to 1 Mbps using a 1 MHz channel, especially now that integrated, reasonable power units are [available assembled and tested from Localino](#). (Yes, this is problematic in the US at the moment due to outdated bandwidth and symbol rate regulations.)
- Arguably, the Amateur Radio [Winlink](#) email system with access via Amateur Radio VHF / UHF fits the description of Digital Networking for Ham Radio. Winlink and Amateur Radio emergency communications networks have been revitalized by system upgrades from Amateur Radio Packet Radio (almost always at 1200 bps) to VARA FM which operates at data speeds of up to 25 kbps on VHF / UHF with very high reliability .
- Similarly, the use of the [VarAC](#) software, combined with VARA HF or VARA FM is creating new Digital (Data) Networks for Ham Radio in local areas. VarAC implements email, bulletins, short messages, file transfers, “digipeating” (not interoperable with packet radio) and other elements of networking - via Amateur Radio.
- There should be at least some mention of the vast network of APRS digipeaters integrated with Internet servers, that can support short messaging via APRS. That fits the definition, at least to some degree, of Digital Networking for Ham Radio.

The “Encryption” Bogeyman

A discussion of encryption here is relevant in the context of the book Digital Networking For Ham Radio because “encryption is illegal in Ham Radio” is frequently referenced in the book.

In modern networking, encryption is now a given. *It... just... is!* One interesting example is that to query the FCC’s callsign database via the FCC website for “official” verification of an Amateur Radio callsign record... is impossible without using HTTPS: (Hypertext Transfer Protocol - *Secure*).

In the book, KW5GP goes to great lengths, with frequent references, that the use of HTTPS (and by extension, other secure systems such as SSL (Secure Sockets Layer) and SFTP (Secure File Transfer Protocol) on any system operating on Amateur Radio spectrum (operating under Part 97 rules) is illegal. (There is an exception for managing Amateur Radio satellites.)

Or, *perhaps not*, depending on one's interpretation of [this one line](#):

§ 97.113 Prohibited transmissions

(a) No amateur station shall transmit:

(4) ... messages encoded for the *purpose of obscuring their meaning*,

That one line has been almost universally interpreted within US Amateur Radio as a blanket prohibition against any use of technology that incorporates encryption such as HTTPS, SSL, or SFTP.

But I think it's a reasonable point of discussion about

purpose of obscuring their meaning,

For example, if you want to query someone's callsign record to validate that they have a valid Amateur Radio license, from an Amateur Radio network, you don't *intend* (your *purpose*) to use HTTPS to access FCC callsign records via the FCC's website. *That* choice has already been made for you *by the website* you need to access. Similarly... would you want to make it possible to configure a repeater controller or remote radio from an Amateur Radio network using Telnet? I posit **no**, because Telnet uses plain text, and is thus easily monitored and hackable by "bad actors". Similarly, would you want to make it possible to upload a new firmware package to a network node or repeater or remote radio using (insecure) FTP? Again, I'd posit **no** because FTP login (username / password) is also plain text, thus easily monitored, and thus easily hackable, and thus could allow "bad actors" to upload *their* firmware.

I posit that if you were to create a simple website (server) to be used over an Amateur Radio network, you'd be hard pressed to configure it so that it *doesn't automatically* incorporate/ require the use of HTTPS to access it via a modern web browser.

My point in the above examples is that such usage isn't using *encryption because you want to obscure the meaning*...you're using *secure* systems which, as a *normal* part of that technology, in this era, that makes use of automatic, behind the scenes (with little choice possible by the user) *encryption as a normal security measure*. HTTPS, SSL, and SFTP all have the encryption "baked in".

There are other ways to create secure systems without encryption such as adding unique cryptographic public key signatures to every transmission... but that's cumbersome and few (or any?) have implemented such systems. The use of encryption is now *just a normal element of networked systems*.

In the end, using HTTPS, SSL, SFTP, and other "normal Internet tools" that incorporate encryption, over Amateur Radio spectrum, is one's individual choice on how to interpret that one line. It's your Amateur Radio license on the line.

This subject will, inevitably, be addressed with the FCC by those who want to modernize Amateur Radio regulations to be more compatible with the technologies and the use cases of the 21st century. Canadian Amateurs are experimenting with "key escrow" techniques, and the use of encryption in Amateur Radio is now being discussed by the ARRL Board.

Conclusion

First and foremost, I'm delighted that this book has debuted, and delighted that it was published by ARRL. It's a good book, and a good treatment of the subject, and my comments above shouldn't be construed as significant criticisms.

I recommend the purchase of this book by most readers of Zero Retries because:

- It's a good treatment of the subject matter, even for those that are already involved in AREDN, HamWAN, or Meshtastic networks. It's an enjoyable read and I appreciate KW5GP's conversational writing style (same as I use here in Zero Retries). While I haven't yet read the book cover to cover, I plan to do so. In my cursory reading this week, I've picked up on some nuances that I thought I understood thoroughly, but apparently didn't.
- This book is a great introduction to radio data networking in Amateur Radio in the 21st century. If you have it on hand, you can loan (or gift) it to potential Amateur Radio Operators who are potential NewTechHams. This book demonstrates that Amateur Radio in the 2020s isn't the "*same old, same old*" general perception of Amateur Radio.
- It's a minor consideration, but widespread purchase / popularity of this book "sends an unmistakable signal" to ARRL management that this, and related subjects, are of significant interest (and thus profit potential). **Revenue = attention** to ARRL management.

The problem with any *book* as a source of information on a rapidly evolving area of technology such as this subject is that by the nature of being published on paper and only published periodically (even annually), it *can't* be comprehensive and ever be completely up to date. *Some try* - witness the attempted comprehensiveness of the **ARRL Handbook** which despite the updates on Amateur Radio data communications technology in 2025 mentioned here (and many more changes *not* mentioned here), the *101st Edition* of the ARRL Handbook didn't get updated on those technologies at all.

The only way I can envision a book that's reasonably up to date and comprehensive on this subject is for it to be very regularly updated... and [published \(paper\) on demand](#), if not published primarily on digital media such as a PDF. I can easily envision such a book being updated several times per year as the technology (rapidly) evolves. The best example of this is AMSAT-US publishes [Getting Started with Amateur Satellites](#), with each annual revision debuting at the Xenia, Ohio Hamvention conference. It would be great if this book was continued with a similar model.

A Suite of ARRL Amateur Radio Networking Books?

Perhaps it would be feasible to address individual technologies with a *suite* of more narrowly targeted books by ARRL, allowing deeper treatments, such as:

- Perhaps the second edition of this book could be retargeted to only discuss microwave data networking without discussion of Meshtastic.
- A new book would discuss Meshtastic / MeshCore / MeshCom, and related technologies in Amateur Radio, such as using APRS over LoRa modulation.
- A book that's a fresh treatment of APRS technology and networks in the 2020s is badly needed.
- Similarly, a book that's a fresh treatment of Amateur Radio Packet Radio and Packet Radio networking in the 2020s is badly needed, including the use of Winlink. Although VARA FM, Icom DD Mode, and (again, in development) MMDVM-TNC aren't Packet Radio, they would fall within the overall scope of such a book. Such a book would be mostly about VHF / UHF operation.

- I think there has been *such significant progress in higher speed data communications in HF*, including the recent change in the US in deleting symbol rates on HF bands in exchange for a 2.8 kHz bandwidth limit, that a new book on Amateur Radio data communications on HF is warranted. Such a book should include significant treatment of VARA HF, [Rhizomatica Mercury](#), and especially the rapid development of [The Packet Radio Forwarding Network](#). Winlink and VarAC should also be mentioned prominently as Amateur Radio network technologies specifically relevant to HF.
- A book discussing Amateur Radio Over Internet activities (generally, the premise of the new [EtherHam](#) website) including remote access of radio receivers and transceivers, repeater linking networks, radio hotspots, etc.

All that said... I'm eventually going to sit down at some point with a dedicated "inputs" copy of the book and mark it up with a highlighter and (many) Post It Notes. Once that's complete (?) I'll hand it over to, or ship it to KW5GP as input for the eventual 2nd Edition of the book.

Thank you, very much, Glen for writing this book! It was badly needed by your fellow Amateur Radio Operators. It is Zero Retries Interesting and I really enjoyed it and learned from it.

Please direct comments / feedback about this article to the [Zero Retries email list with the #ZR0240 hashtag](#).

ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

TPRFN Two New Resource Pages

Glenn Allison N3MEL [on the Zero Retries email list](#):

We are excited to announce the launch of two new internal tools designed to provide better visibility into our infrastructure: the **TPRFN Network Map** and the **TPRFN Network Health** page. These resources are now live and available on the network website. Here is a quick breakdown of what's new:

- **TPRFN Network Map:** A comprehensive, interactive visual guide to our entire network architecture. Use this to understand node connectivity, signal flow, and spatial distribution at a glance.
- **TPRFN Network Health Page:** Your real-time pulse on system performance. This dashboard tracks uptime, latency, and active alerts, ensuring you have the data you need to stay ahead of potential issues.

Why the update? Our goal is to move from reactive troubleshooting to proactive management. By putting these visual and diagnostic tools in your hands, we're making it easier for everyone to stay informed and aligned.

Explore the Network Map & Network Health pages here: <https://www.tprfn.net/network-live-connections>

If you have any feedback or notice any data discrepancies, each page has its own support link.

Also attached are the User Manual for the Network Map page.

Network Map page created by Tony K1AJD

Network Health Page created by Jason N4SFL

Thank you to both these guys and to all the stations that make up the network..

As I mentioned earlier in this issue, I think that [The Packet Radio Forwarding Network - TPRFN](#) is an important new resource in Amateur Radio data communications infrastructure. One day soon in 2026 I'll be back online on HF data communications and try to plug into TPRFN.

New Amateur Radio Organization - Alliance Amateur Radio Society

I just discovered this interesting new Amateur Radio organization today - [Alliance Amateur Radio Society](#) (AARS). I appreciate the organization's spirit and especially its motto:

Loqui requirit vires

(to speak requires strength)

Who we are

Born out of the Liberal Preppers Facebook group, our founder Todd Owen realized - based off his experience in the hobby as well as feedback from the group - there was a need for a club that pushed aside the the traditional conservative mindset of the majority of ham radio clubs, one that is welcoming to marginalized enthusiasts across the country (and around the globe).

The traditional ham community talks about being friendly, helpful, and supportive and they do good work in many situations, especially in times of crisis or assisting with community events.

Unfortunately, this doesn't always get applied to the day-to-day interaction and acceptance. The term Sad Ham is well-known for a reason: because there are many of them. From chastising a new ham for stumbling over their callsign to making far right political statements over the air (and in violation of the regulations and spirit of amateur radio) to openly discriminating against people's gender, sexual orientation, neurology, race, religion, the list is unfortunately long. The list of marginalized and under-represented groups is just as long.

I've been saying here in Zero Retries that new, *and new types* (primarily virtual) of Amateur Radio organizations should... and hopefully *would*... emerge in this era as a counterpoint of Amateur Radio organizations that were organized in the 20th century.

AARS here, [Surrey Amateur Radio Communications Society - SARC](#) (publisher of the wonderful [The Communicator](#) newsletterzine), [Online Amateur Radio Community](#), [NARS - Narwhal Amateur Radio Society, NR7WL](#), and many other organizations **are** emerging and demonstrating that there **can** be *new types of Amateur Radio communities in this era*, and are very welcome into the incredibly diverse community that is Amateur Radio.

New High-Performance Software Defined Radio

Received via email - *I had to look* despite NI (formerly, I guess, National Instruments) systems being completely *unaffordium* in the current Zero Retries experiments / projects budget:

[Ettus USRP X420](#)

The latest USRP (Universal Software Radio Peripheral) device offers:

- A 10 MHz to 20 GHz frequency range

- Up to 1 GHz bandwidth
- Multichannel phase coherency < 1 degree RMS

Up... to... **1 GHz bandwidth** ??????????

Wow... and wow... Give this technology five years of technological evolution (to become a bit more affordable) and imagine what Amateur Radio could do with such a capability.

One thing that leaps to mind with this kind of capability is being able to do precision navigation with only terrestrial radio transmissions. If you know where the local television and radio broadcasters are, and a few other known location radio sources (remember, with this you could receive *nearly any* radio transmission), you could essentially navigate with automatic direction finding.

Auto-NVIS: Autonomous Ionospheric Nowcasting System

Spotted on GitHub authored by Bob McGwier N4HY:

What is Auto-NVIS?

An autonomous, unattended ionospheric monitoring and HF propagation forecasting system that combines:

- *Real-time GNSS-TEC and ionosonde measurements*
- *Advanced nonlinear state estimation (Square-Root UKF)*
- *Physics-based background models*
- ***IONORT-style 3D magnetoionic ray tracing with multiple integrators***
- ***Homing algorithm*** for automatic path finding (winner triplets)
- *Automatic space weather event response*

Result: Continuous, accurate NVIS frequency planning during Solar Cycle 25 volatility.

Overview

Auto-NVIS is an autonomous, unattended system designed to provide real-time HF propagation forecasting for Near Vertical Incidence Skywave (NVIS) communications during the volatile conditions of Solar Cycle 25 (2024-2026 solar maximum). The system integrates real-time sensor fusion, advanced nonlinear state estimation, and deterministic ray tracing into a closed-loop control system capable of operating 24/7 without human intervention.

Mission Statement

Provide continuous, accurate, and physically-valid ionospheric state estimation and NVIS frequency planning that automatically adapts to extreme space weather events—including solar flares, geomagnetic storms, and sudden ionospheric disturbances—ensuring reliable HF communication links during critical conditions.

Architectural Philosophy

“Physics-Based, Data-Driven”

The system does not rely solely on:

- Empirical statistics (which fail during anomalies)
- Raw observational data (which is often sparse and noisy)

Instead, Auto-NVIS uses a **Square-Root Unscented Kalman Filter (SR-UKF)** to assimilate real-time observations into physics-based background models (IRI-2020 or NeQuick-G), ensuring outputs that are both physically valid and observationally accurate.

I've been intrigued with (the practicality of) NVIS since I learned about it being an integral element of [The Packet Radio Forwarding Network - TPRFN](#) (see above) for *reliable, predictable* **regional** communications via High Frequency (HF) Amateur Radio. With that, use of data modes with vastly improved weak signal performance, and Software Defined Radios, HF has become steadily more usable every year for data communications.

2026 Hamcation AMSAT Forum | Drew Glasbrenner, KO4MA President's Update

I learned... **a lot**... from KO4MA's presentation. If you're pressed for time, I suggest starting at 21:53 (see the timestamps in the description of the video).

In that segment of the video, KO4MA finally said *something, substantive, **authoritatively*** about the potential for Amateur Radio GEO capabilities for the Western Hemisphere, from the perspective of AMSAT-US. Finally, someone in authority at AMSAT-US has said that they're in active discussion with ARDC about funding an Amateur Radio GEO.

That... is progress! With this, I have some renewed hope for AMSAT-US under KO4MA new leadership!

Please direct comments / feedback about **ZR > BEACON** to the [Zero Retries email list with the #ZR0240 hashtag](#).

Closing Thanks

My ongoing **Thanks** to:

Tina Stroh KD7WSF for, well, *everything!*

Jack Stroh, Late Night Assistant Editor Emeritus

Fiona and Shrekya Stroh, Late Night Assistant Editors In Training

Founding Members who generously support Zero Retries financially:

Founding Member 0000 - Steven Davidson K3FZT (Renewed 2025, *3rd year!*)

Founding Member 0001 - Randy Smith WU2S (Renewed 2025, *3rd year!*)

Founding Member 0002 - Chris Osburn KD7DVD (Renewed 2025, *3rd year!*)

Founding Member 0003 - Don Rotolo N2IRZ (Renewed 2025, *3rd year!*)

Founding Member 0004 - William Arcand W1WRA (Renewed 2025, *3rd year!*)

Founding Member 0005 - Ben Kuhn KU0HN (Renewed 2025, *3rd year!*)

Founding Member 0006 - Todd Willey KQ4FID (Renewed 2025, *3rd year!*)

Founding Member 0007 *and* 0010 - Merik Karman VK1DF / VK2MKZ (Renewed 2025 x2, *3rd year!*)

Founding Member 0008 - Prefers to Remain Anonymous 08 (Renewed 2025, *3rd year!*)

Founding Member 0009 - Prefers to Remain Anonymous 19 (Renewed 2025, *2nd year!*)

Founding Member 0011 - Rick Prelinger W6XBE (Renewed 2025, *2nd year!*)

Founding Member 0012 - Ryan Tolboom N2BP (Renewed 2025, *2nd year!*)

Founding Member 0013 - Newton White N4EWT (Renewed 2026, *2nd year!*)

Founding Member 0014 - Joe Hamelin W7COM (Renewed 2026, *2nd year!*)

Founding Member 0015 - Rich Stocking N7OP (New 2025)

Founding Member 0016 - Prefers to Remain Anonymous 77 (New 2025)

Founding Member 0017 - Phil Karn KA9Q (New 2025)

Founding Member 0018 - Prefers to Remain Anonymous 95 (New 2025)

Founding Member 0019 - Prefers to Remain Anonymous 0108 (New 2025)

Founding Member 0020 - Prefers to Remain Anonymous 110 (New 2025)

Founding Member 0021 - Prefers to Remain Anonymous 111 (New 2025)

Founding Member 0022 - Prefers to Remain Anonymous 112 (New 2025)

Founding Member 0023 - Prefers to Remain Anonymous 116 (New 2026)

Founding Member 0024 - Rob Bowser (SPOOLTENNA) (New 2026)

Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

You thousands of readers of Zero Retries without which there would be little point in publishing this newsletter.

Permission to Reuse Zero Retries Content

Blanket permission is granted for *Amateur Radio use* of any Steve Stroh content in Zero Retries for Amateur Radio newsletters and distribution via Amateur Radio such as (but not limited to) Packet Radio Networks, Packet Radio Bulletin Board Systems, Repeater Nets, etc.

In such usage, please provide appropriate authorship credit for the content (especially for guest authors) and mention that it was first published in Zero Retries newsletter, preferably in this format:

This article is reprinted with permission. It was first published in Zero Retries newsletter, issue Zero Retries (number), (date) - (include full web link of the specific issue).

It's appreciated (a courtesy, *but not required*) to notify Zero Retries Editor Steve Stroh N8GNJ of any reuse of Zero Retries content - editor@zeroretries.net.

If you'd like to republish an article in this issue for other uses, just ask.

All excerpts from other authors or organizations, including images, are intended to be [fair use](#). *Unless otherwise noted in the article*, there are no paid promotional items in any Zero Retries articles.

Portions Copyright © 2021, 2022, 2023, 2024, 2025, 2026 by Steven K. Stroh.

 [Previous Issue of Zero Retries](#) \ [Next Issue of Zero Retries](#) 

Zero Retries 0240 was published on 2026-02-27. This issue was 6999 words.

(end)